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IS 1448-31 (1968): Methods of test for petroluem and its products, Part 31: Smoke point [PCD 1: Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants]

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IS : 1448 [P : 31] - 1968
(Reaffirmed 2003)

Indian Standard

METHODS OF TEST FOR PETROLEUM AND ITS PRODUCTS

[P : 31]

SMOKE POINT

(First Revision)

Fourth Reprint DECEMBER 1998

UDC 665·6/·7:536·421·2

Adapted from the Institute of Petroleum Standard No. IP 57/55 and ASTM Designation D 1322-64.

[In this revision, the test procedure has been improved and the limits of precision of test results modified in the light of the improved procedure.]

1. SCOPE

1.1 This method is intended for the determination of smoke point of kerosine and other volatile liquid fuels including gas turbine (jet) fuels.

2. TERMINOLOGY

2.0 For the purpose of this method, the following definition shall apply.

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May 1968

2.1 Smoke Point — The maximum flame height in millimetres at which kerosine or other volatile liquid fuels including gas turbine (jet) fuels will burn without smoking, when determined in the apparatus and under conditions specified in this method.

3. OUTLINE OF THE METHOD

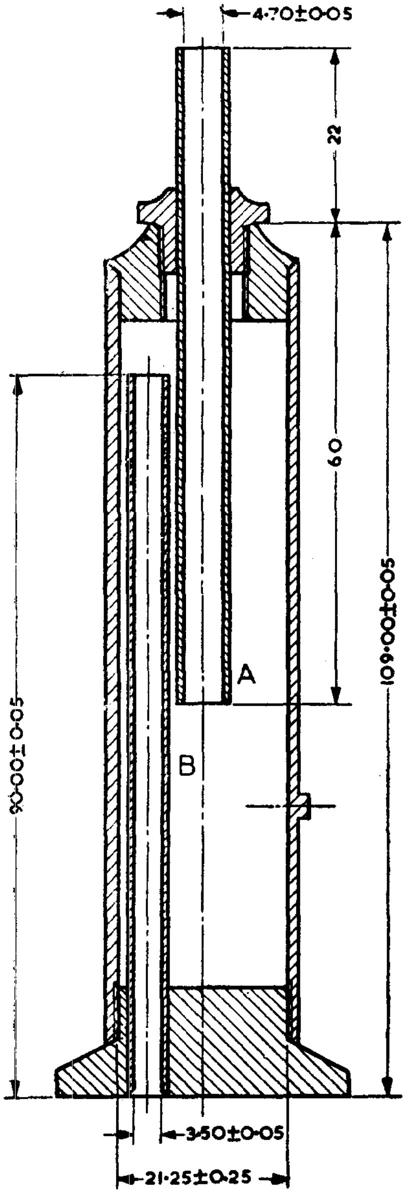
3.1 The sample is burned in a standard lamp in which it is possible to adjust the flame height against a background of a graduated millimetre scale. The smoke point is measured by raising the wick until a smoky flame is produced and then lowering to the point where the smoky tail just disappears. This flame height, measured to the nearest millimetre, is the smoke point of the sample.

4. APPARATUS

4.1 Smoke Point Lamp — Constructed according to the specification given in **4.1.1** to **4.1.3**. The lamp consists of an oil container provided with a wick tube and air vent, a gallery fitted with a wick guide and provided with air inlets, a lamp body, and a chimney. The lamp is also provided with a 50-mm scale specified in **4.1.3**.

4.1.1 *Oil Container* — This shall be as illustrated in Fig. 1 and shall conform to the following dimensions:

	Dimension mm
Body Oil Container:	
Internal diameter	21·25 ± 0·25
External diameter	Sliding fit in holder
Length, without cap	109·00 ± 0·05
Thread on cap	9·5 mm dia screwed 1·0 mm pitch
Wick Tube *A*:	
Internal diameter	4·7 ± 0·05
External diameter	Close fit in wick guide
Length	82·00 ± 0·05
Air Vent *B*:	
Internal diameter	3·50 ± 0·05
Length	90·00 ± 0·05



All dimensions in millimetres.

FIG. 1 OIL CONTAINER

4.1.2 *Lamp* — This shall be as illustrated in Fig. 2 and shall conform to the following dimensions:

	Dimension mm
Internal diameter of socket of oil container *C*	23·80 ± 0·05
Internal diameter of wick guide *D*	6·00 ± 0·02
Diameter of each of 20 air inlets *E*	2·90 ± 0·05
External diameter of gallery *F*	35·00 ± 0·05
Diameter of each of 20 air inlets in the gallery *F*	3·50 ± 0·05
Internal diameter of lamp body *G*	81·0 ± 1·0
Internal depth of lamp body *G*	81·0 ± 1·0
Internal diameter of chimney *H*	40·0 ± 1·0
Height, top of chimney *H* to centre of lamp body *G*	130·0 ± 1·0

4.1.3 *Other Requirements* — The lamp shall also comply with the following requirements:

a) The top of the wick guide shall be exactly level with the zero mark on the scale;

b) The scale shall be marked in white lines on black glass on each side of a white or black strip, 2 mm in width. It shall have a range of 50 mm, graduated in one millimetre, figured at each 10 mm, and with longer lines at each 5 mm;

c) A device for raising or lowering the flame shall also be provided. The total distance of travel shall be not less than 10 mm, and the movement shall be smooth and regular. Further, with the oil container in the lowest position and the wick projecting 6 mm above the top of the oil container, the top of the wick shall not project above the wick guide (zero on the scale);

d) The glass of the door shall be curved to prevent the formation of multiple images; and

e) The joint between the base of the oil container and its body shall be oil-tight.

4.2 Wick — Woven solid circular wick of cotton yarn and complying with the following requirements shall be used:

Count of Yarn	
Casing	66 tex/3 (or 9s/3)
Filling	98 tex/4 (or 6s/4)
Weft	40 tex/2 (or 15s/2)
Number of Threads	
Casing	17 ends
Filling	9 ends
Picks	6 per cm

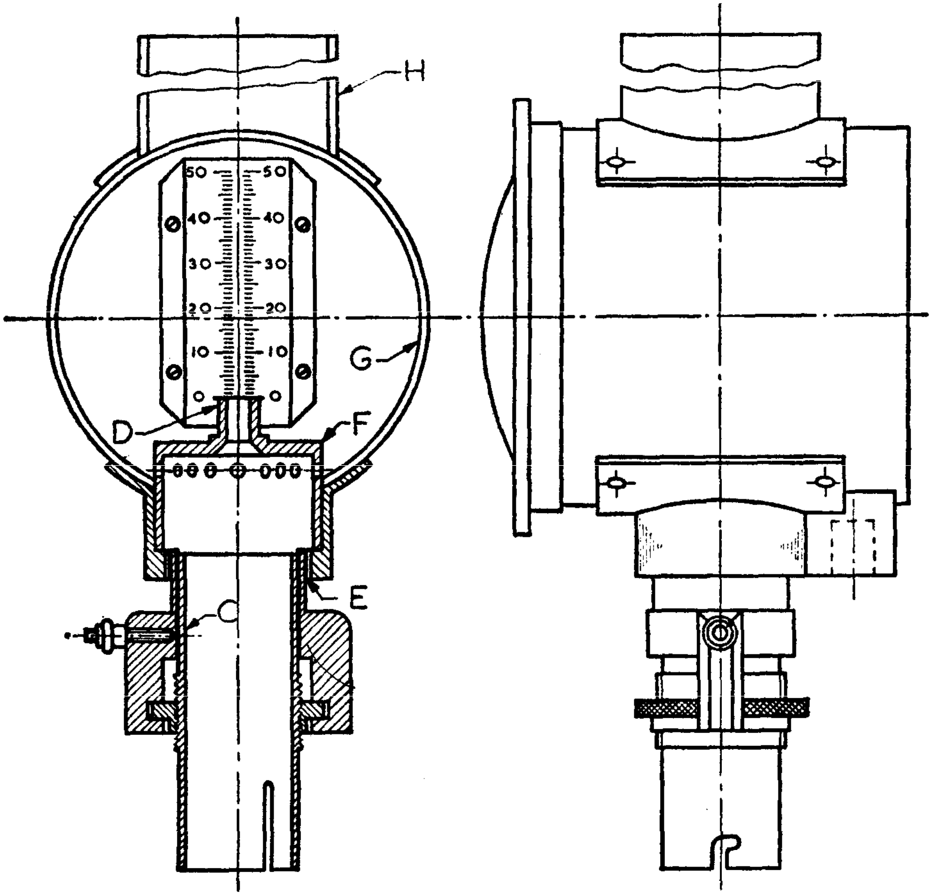


FIG. 2 LAMP

5. PRECAUTIONS

5.1 The test shall normally be carried out at a room temperature of not less than 15°C; *it is recommended that the room temperature and the barometric pressure be recorded.*

5.2 Place the lamp in a vertical position completely protected from draughts.

6. PROCEDURE

6.1 Introduce 20 ml of the previously filtered sample into the clean, dry oil container.

6.2 Extract a piece of wick, not less than 12·5 cm in length, with a suitable volatile solvent and dry it for half an hour at 100 to 110°C. For referee work, or in cases of dispute, use a new wick extracted and dried in this manner. For other purposes, the wick may be from a previous determination.

6.3 Soak the wick in the sample under test and place in the wick holder, carefully easing out any twists arising from this operation. It is advisable to re-soak the burning end of the wick in the sample.

6.4 Place the wick holder in the container, screw home and ensure that the air inlet is free from oil. Cut the wick horizontally and trim free of frayed ends so that 6 mm of wick projects from the container.

6.5 Maintain the oil container at a temperature of 20 to 25°C for 10 minutes. Insert into the lamp and light the wick.

6.5.1 For samples of viscosity similar to that of mineral colza oil, maintain the oil container at a temperature of 35 to 45°C for 10 minutes prior to lighting the wick.

6.6 Adjust the wick so that the flame is about 1 cm high and allow the lamp to burn for 5 minutes. Raise the wick until a smoky tail appears, then lower the wick slowly through the following stages of flame appearances:

a) A long tip, smoke slightly visible, erratic and jumpy flame.

b) An elongated pointed tip with the sides of the tip appearing concave upward as shown in *A* of Fig. 3.

c) The pointed tip just disappears leaving a very slightly blunted flame as shown in *B* of Fig. 3. Jagged, erratic, luminous flames are sometimes observed near the true flame tip. These are to be disregarded.

d) A well rounded tip as shown in *C* of Fig. 3. Estimate the height of flame as illustrated in *B* of Fig. 3, to the nearest millimetre. Record the smoke point as observed. To eliminate errors due to parallax (*see* Note), the eye of the observer shall be slightly to one side of the centre line, so that a reflected image of the flame is seen on the scale on one side of the central vertical white line, and the flame itself is seen against the other side of the scale. The reading for both observations shall be identical.

NOTE — A sighting device may also be used to eliminate parallax and to facilitate reading the flame height.

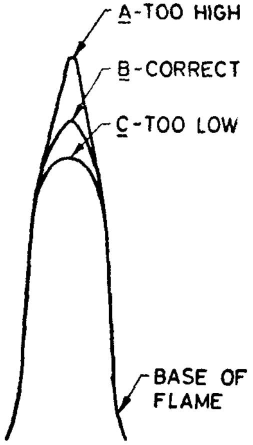


FIG. 3 TYPICAL FLAME APPEARANCE

6.7 Make three separate observations of the smoke point by repeating the flame appearance sequence in **6.6**. If these values vary over a range greater than 1·0 mm, repeat the test with a fresh sample and a new wick.

6.8 Remove the oil container from the lamp, clean out with solvent, and dry for half an hour at 100 to 110°C. Blow out with air to make ready for subsequent test.

7. REPORTING

7.1 Report the mean of the determinations, to the nearest 1·0 mm as the smoke point.

8. PRECISION

8.1 Result of duplicate tests shall not differ by more than the following amounts:

Smoke Point mm	*Repeatability*	*Reproducibility*
Up to 20	1	2
20 to 30	1	3
30 ,, 40	1	4